BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Application of Milwaukee Water Works, Milwaukee County,
For Authority to Increase Water Rates — Docket No. 3720-WR-108

SURREBUTTAL TESTIMONY OF ERIC ROTHSTEIN
June 20, 2014

Q. Please state your name.

A. My name is Eric Paul Rothstein.

Q. Did you provide direct and rebuttal testimony on behalf of the intervening wholesale customers related to Milwaukee Water Works' (MWW) rate application (Ex-MWW-Brandt-2), the Customer Demand Study prepared by Trilogy Consulting, LLC dated April 2014 (Ex-MWW-Cramer-2), and the cost of service study (COSS) prepared by Raftelis Financial Consulting (Ex-MWW-Wright-2)?

A. Yes.

Q. Have you reviewed the rebuttal testimony and exhibits submitted in this case by Milwaukee Water Works staff, Public Service Commission staff as well as MWW's consultants with Trilogy Consulting, LLC and Raftelis Financial Consultants, Inc.?

A. Yes and I have also reviewed rebuttal testimony and exhibits submitted by Miller Coors.

Q. What is the purpose of your surrebuttal testimony?

A. The purposes of my surrebuttal testimony are to: (1) to address the rebuttal testimony of MWW Superintendent Carrie Lewis; (2) the rebuttal testimony of Peiffer Brandt and John Wright of Raftelis Financial Consulting, and (3) address the rebuttal testimony related to the

Customer Demand Study submitted by Trilogy Consulting LLC's Christine Cramer and Erik Granum.

Q. What are your comments with regard to the rebuttal testimony of Superintendent Lewis?

A. Ms. Lewis states:

> *I would observe that the caustic and demeaning tone of Mr. Rothstein's narrative is inappropriate. The absence of a respectful, professional presentation is regrettable.* (Rebuttal-MWW-Lewis-9, lines 2-3.)

I would simply like to note that my strident expression was not intended to be caustic or convey disrespect. I have the utmost respect for water utility professionals across the country, including at MWW specifically, and for my peer consultants in this case. Though I do not retract the substance of my points, and believe there is value in spirited, vociferous debate - I regret any offense taken by the tone of my expression.

Q. What is your response to Peiffer Brandt's rebuttal testimony with respect to MWW's proposed rate of return differential?

A. Mr. Brandt suggests that my testimony:

> *"… misses the point of the risk the owners of the system, the retail customers, face. The owners of the system bear risk that nonowners (wholesale customers) do not, whether these risks are imposed by the wholesale customers or not*. (Rebuttal–MWW-Brandt-2, line 21 to -3, line 1.)

I would respectfully suggest that Mr. Brandt misses the point. Yes, owners of the system face risks. They earn **a return**, in part, for bearing these risks – whether imposed by delivery of retail or wholesale service. But the question is not whether MWW is entitled to a return, the question is whether MWW should earn a **higher** rate of return from wholesale customers than from retail customers. For the answer to this question, the salient point is that the wholesale customers impose no greater risks to MWW than retail customers (and

arguably, as noted in my rebuttal testimony (Rebuttal-Wholesale Customers-Rothstein-4), mitigate the risks that MWW faces for delivery of service to all its customers.)

Mr. Brandt cites three forms of financial risk that he purports merits a differential rate of return. These risks stem from (1) MWW's cash position, (2) the potential for wholesale customers to leave the MWW system, and (3) the need to cover extraordinary operating costs. Again, neither the first or third of these risks are particular or fundamentally different for the delivery of wholesale versus retail service. If MWW had no wholesale customers at all, it would still need to establish an adequate cash position and still need to cover extraordinary operating costs. Bearing these types of financial risks – which MWW can easily mitigate – are among the reasons a return is justified, but not why a **greater** return should be exacted from wholesale customers. As to the second point, rather than retread the ground already covered or debate about potential customer departures, I would only remind the Commission that the wholesale customers, like the retail customers, are now bearing the costs of those major retail users who have actually left the system.

Q. What is your response to Peiffer Brandt's rebuttal testimony with respect to the risks associated with MWW's limited reserves?

A. First, I would concur that a utility should hold adequate reserves to ensure it is able to manage unforeseen variability in revenue and expense streams. Yet, any risks that MWW bears due to inadequate cash reserves are self-inflicted, but also easily mitigated. I expect the Wholesale Customers would have no objection to MWW carrying adequate cash reserves consistent with the Fitch median for AA utilities that Mr. Brandt cites. The fact that MWW does not carry these reserves is not a reflection of requirements for its service to wholesale customers. Rather, this is a reflection of City of Milwaukee and MWW financial

management decisions – arguably that inappropriately blur lines of governmental fund integrity. This is highlighted by Mr. Brandt's statement regarding what would happen in the event of an unexpected financial upset whereby "MWW will increasingly rely on the City**'**s general fund to meet obligations." (Rebuttal-MWW-Brandt-5, line 5.) Dubious financial management is not a legitimate basis for imposing a higher rate of return on wholesale customers.

Q. What is your response to Peiffer Brandt's rebuttal testimony with respect to MWW's capital structure and proposed rate of return?

A. First, it bears noting that I did not, as Mr. Brandt misrepresents, suggest that the "PSC **abandon** its practice with regard to determining an allowable rate of return on rate base." (Rebuttal-MWW-Brandt-9, lines 14-17, emphasis added.) I did suggest that to ignore MWW's actual capital structure in deference to an established "capital structure neutral" practice is problematic for the atypical circumstances that the MWW case presents.

Furthermore, Mr. Brandt misinterprets my reasoning, surmising incorrectly that "[a]pparently Mr. Rothstein is under the impression the current approach will result in a $16.7 million dollar **windfall** to the City of Milwaukee." ..(Rebuttal-MWW-Brandt-11, lines 5-6, emphasis added). I do not characterize the revenue from the rate of return, after MWW's debt service has been paid, as a "windfall" to the City. Rather, I simply note the amounts, in absolute dollars, of funds coming to the City of Milwaukee as the system owner and recipient of Net Property Tax Equivalent payments.

After a review of other regulatory commissions' practices and the mechanics of a weighted cost of capital approach where "capital structure is very important," (Rebuttal-MWW-Brandt-10, line 17), Mr. Brandt notes:

> *In Wisconsin, the PSC has **elected** to use an approach that is capital structure neutral thereby removing capital structure from consideration when determining rate of return. The PSC's capital structure neutral approach essentially treats all capital investment the same from a cost perspective regardless of whether that investment is funded with debt or equity.* (Rebuttal–MWW–Brandt-11, line 20 to -12, line 2, emphasis added.)

My testimony suggests that in light of the atypical attributes of MWW's capital structure, the Wisconsin PSC's election of this "capital neutral" approach bears reconsideration – and that the capital structure sensitive approaches used by other regulatory commissions and discussed in the AWWA M1 manual may inform that re-evaluation.

Q. Mr. Brandt criticizes your assumption of a 50% debt / 50% equity structure for your proposed adjustment to the allowed rate of return. Why did you assume a 50% debt / 50% equity capital structure for your proposed adjustment to the allowed rate of return?

A. It bears noting that the nature of this type of adjustment ***requires*** making an assumption of some kind with respect to capital structure. In doing so, I make very clear that my calculation involves use of an assumption - offering a specific question and response on the subject (Direct-Wholesale Customers-Rothstein-19 to 20) – and characterize the assumption as "reasonable". (Direct-Wholesale Customers-Rothstein-20, line 7-8.) Nowhere in my testimony do I contend (or even imply) that the AWWA M1 manual is offering recommendations on what a utility's capital structure should be, but I simply use its example to demonstrate the reasonableness of my assumption. An alternative reference for the reasonableness of this assumption is the PSC's own website as cited in my rebuttal testimony. (Rebuttal-Wholesale Customers-Rothstein- 6, lines 3-16.) Both yield debt to equity ratios lower than the average of large utilities, both nationally and in Wisconsin, as

my exhibits show. (Ex.-Wholesale Customers-Rothstein-1 and Ex.-Wholesale Customers-Rothstein-2.)

Q. Do you agree that it makes sense for MWW to have a lower debt to equity ratio than other utilities in Wisconsin as Mr. Brandt contends?

A. After reciting a circular argument on this subject - PSC standard practice does not consider capital structure so the consideration of capital structure is not standard practice – Mr. Brandt offers the perspective that MWW's capital structure "makes sense". In doing so, he contends that:

> *Milwaukee has the capacity and infrastructure to serve a larger population than it currently serves and has not needed to do growth related improvements in a long time. Growth related improvements are most commonly debt financed because these assets serve customers for many years so the cost should be paid over many years. (*Rebuttal-MWW-Brandt-14, lines 7-10.)

I have two responses to Mr. Brandt's statement. First, the logic offered for why growth related improvements should be debt financed – that they will serve customers for many years – applies equally for water main replacements and other capital infrastructure that MWW has resolved to entirely cash-finance. Second, a low level of utility debt is not desirable in and of itself. Yet, MWW's low level of debt does now provide MWW the flexibility to borrow on good terms to make capital investments without requiring cash financing or the imposition of such substantial rate increases.

Q. Do you have any further comments on Mr. Brandt's rebuttal testimony?

A. No.

Q. What are your comments with regard to Mr. Wright's rebuttal testimony?

A. Mr. Wright makes two points in response to my testimony on the allocation of Public Fire Protection. He states that:

> *... regardless of what may or may not be common national practice regarding the allocation of public fire protection costs to wholesale customers, it is the Commission's common practice to do so in the State of Wisconsin.* (Rebuttal-MWW-Wright-4, line 21 to -5, line 2.)

And:

> *Manual M1's failure to provide a cost allocation example featuring the allocation of public fire protection costs to wholesale customers provides absolutely no basis for the Commission to make the major change of disallowing the allocation of public fire protection costs to MWW's wholesale customers.* (Rebuttal-MWW-Wright-5, lines 11-14.)

Again, the Commission is asked to defer to the circular argument espoused by MWW's witnesses – that a revision to a standard practice should not be considered because it is the Commission's standard practice. Throughout my testimony, I suggest that the Commission reconsider some its standard practices, especially as applied to MWW's atypical situation. Standard practice should not be justified just because it is standard practice. If the Commission is to consider altering its standard practice, it seems reasonable for the Commission to consider practices elsewhere and as presented in the AWWA M1 Manual of Practice. My testimony simply states that these facts are "noteworthy" for the Commission's consideration as it determines what is reasonable in this case. (Direct-Wholesale Customers-Rothstein-24 to 25.)

Q. Do you have any further comments on Mr. Wright's rebuttal testimony?

A. No.

Q. What are your comments regarding Ms. Christine Cramer's rebuttal testimony?

A. Ms. Cramer states that I implied MWW "intentionally and purposely misused data to shift costs to wholesale customers," and complains of my "all-knowing tone". (Rebuttal-MWW-Cramer-1, lines 14-16.) I wish to clarify. I have no knowledge of MWW's intent and purpose in misusing the data derived from the Customer Demand Study. My testimony is

intended to speak to the effect of this misuse. Moreover, I readily acknowledge that I am far from "all-knowing" – and not much to look at in the bargain – though I do have some insights into these matters gleaned from over 20 years experience in water and wastewater rate-making.

Ms. Cramer also declares that I am asking the Commission to

> *... throw out a substantial volume of data on the actual demand patterns of all customer classes in MWW's service area, obtained by MWW at substantial effort and cost over the last two years, in favor of demand factors based on a patchwork of untested assumptions, rules of thumb and intuition.* (Rebuttal-MWW-Cramer-2, lines 1-4.)

Again, I wish to clarify. Consistent with the Commission's decision in MWW's 2010 rate case (referenced in my testimony at Direct-Wholesale Customers-Rothstein-14, lines 12-20), I contend that the Commission cannot accept a set of revisions when there is insufficient information in the record to support a revision. The Customer Demand Study (and the testimony provided by Ms. Cramer and Mr. Granum in rebuttal) fails to provide sufficient information. The Commission should rightly proceed in a manner in keeping with medicine's Hippocratic oath: "First, do no harm".

The Commission is not being asked to throw anything out; it is being asked not to accept fundamentally flawed data in the first place. It is not being asked to opine or infer whether MWW had "preconceived notions" about what the demand factors should be; it is being asked not to find demand factors compelling merely by virtue of the volume of data collected or the expense and effort involved in its collection. A lot of unrepresentative data is similar to a limited amount of unrepresentative data --it is uninformative.

Q. What about Ms. Cramer's basic point in discussions of the sampling of various MWW retail customer classes that the addition of customers produced a convergence toward

average demand factor values that may reasonably be expected to approximate the average for the sample?

A. It is true that the smaller the sample size, the greater the potential variability **of the average of the sample** in repeated observations. Accordingly, as Ms. Cramer's analyses demonstrate, the larger the number of customers sampled, the lower the variability of the average demand factors calculated -- though one can easily imagine a sampling outcome whereby an anomalous data point or points increases the sampled average when added, suggesting the curves drawn in Ms. Cramer's exhibits are hardly immutable.

Ms. Cramer's response, however, completely misses the point. The question is not whether sampling more customers reduces variability of the sample average from sample to sample, but whether any of the sample averages are representative of the customer class populations and whether the resultant demand factors provide a reliable metric of class contributions to system peak demands.

Consider, for example, a sample of 100 customers that have normally distributed demand factors ranging from 1.0 to 2.0 (within 2 or 3 standard deviations). As Ms. Cramer suggests, as more and more individual customers' demand factors are calculated, the average demand factor will converge toward 1.5. However, if the actual customer population of 10,000 customers is also normally distributed, but with demand factors ranging from 1 to 2.5, the sampled average of 1.5 from the 100 customers sampled, misstates the customer population's demand ratio of 1.75. In other words, the convergence of average ratios within a sample does nothing to establish the representativeness of the sample with respect to the population. For this, it is necessary to return to the fundamental questions (Direct-Wholesale Customers-Rothstein-8 to 9) of whether the mixed bags of limited retail samples, scattered

across 3 disparate monitoring periods, are assuredly representative of the customer class populations from which they are drawn. Ms. Cramer's testimony offers no further evidence with respect to these questions – and no such assurance is rendered by any of the data presented by MWW's witnesses in this case.

Q. Do you have any further comments on Ms. Cramer's rebuttal testimony?

A. No.

Q. What are your comments with regard to Erik Granum's rebuttal testimony?

A. First, for my part, I'd like to clearly withdraw the offhand remark in my direct testimony to which Mr. Granum seems to refer where I quip that the Customer Demand Study was "presumably intended to" shift cost responsibilities from retail to wholesale customers. (Direct-Wholesale Customers-Rothstein-4, lines 20-23.) The reality is that I have no absolute knowledge of why this study, given the significant limitations acknowledged therein and the even more profound weaknesses highlighted in the Wholesale Customers group's testimony, would nevertheless be relied upon for MWW's COSS. My remark was mere speculation. The salient point, however, is that irrespective of intent, and irrespective of the amount of data collected, the Study fails to yield revised demand factors that clear the Commission's stated threshold requirements of being based on "sufficient information" to support a revision of those customer class demand factors previously accepted by the Commission. (Direct-Wholesale Customers-Rothstein-14, lines 12-20.)

Second, Mr. Granum states that he will address each of my and Pat Planton's arguments "with additional explanation to the extent possible." (Rebuttal-MWW-Granum-1, lines 13-14.) Yet, his additional explanations cannot resurrect a study inexorably flawed by the data collection inadequacies and coping methodological over-reaches delineated in the

direct testimony of the Wholesale Customers group's witnesses.

Q. What are your reactions to Mr. Granum's defense of the use of demand ratios drawn from 2012 and 2013?

A. First, Mr. Granum states:

> *The methodology in determining the demand ratios for wholesale customers took weather fluctuations into account by averaging the most recent data from 2012 and 2013 (that indeed appear to have weather patterns above and below the norm, as I will detail further) in order to arrive at figures that are representative of a recent average, or typical, year for wholesale customers*. (Rebuttal-MWW-Granum-3, lines 18-22.)

Mr. Granum's hypothesis appears to be that by averaging together unrepresentative data from 2012 with unrepresentative data from 2013, one somehow arrives at data that is representative of typical consumption for the class. I remain skeptical of this hypothesis.

Second, Mr. Granum goes to some length to contend that the data collected for the wholesale customers is robust based on their examination of month over month ratios of maximum-day and maximum hour usage to average day usage for each month. While this may reveal consistency between months, it is not particularly relevant for determination of the peak day and hour demands to average **annual** (not monthly) demands. While both peak and average demands may rise and fall together in individual months as weather patterns, economic activity and other factors influence diurnal patterns over the course of the year, costs allocations are not based on monthly peak to average ratios. The relevant ratios for purposes of cost allocations are **annual** peak to average ratios.

Q. What is your response to Mr. Granum's statement that the example offered in your direct testimony is an oversimplification and meaningless?

A. I imagine that Mr. Granum's tone – which others might find caustic and demeaning, though I do not – may be a response to the simple and intuitive example offered. Notwithstanding

Mr. Granum's criticism of my example, the simple point of it rings true. Averaging unrepresentative data from one period with unrepresentative data from another period will only coincidentally result in data that is representative of a typical period.

Q. What is your response to Mr. Granum's defense of the use of different time periods for collection of demand data?

A. I am struck by Mr. Granum's statement that: "the goal of developing peak demand ratios is to determine what they would be in a typical, or average, year." (Rebuttal-MWW-Granum-7, lines 17-18.) Perhaps so, but the fact that MWW proposes to use the demand factors from the Study to allocate costs based on class contributions to system peak and average demands require that the ratios produced from the Study be fit for that purpose. The **absolute** extent by which the demand factors mimic typical demand patterns is not what is relevant, but whether they reflect **relative** demands across customer classes accurately. In this regard, it is not necessarily true, or even likely, that measurements drawn from different time periods (and different classes), and averages of averages across only 2 admittedly unrepresentative seasons, would produce class demand factors that accurately describe relationships between each classes' contributions to system peak demands.

Q. Mr. Granum's cites your previous testimony in the Oak Creek case to contend that the use of actual demand data is an improvement over the "assumptions that have been used in the past, and which the data show are not accurate." (Rebuttal-MWW-Granum-8, lines 4-10.) What is your response?

A. I agree that in the event that sufficient information is collected through a demand study that is not fundamentally flawed, that information should serve as the basis for class demand factors. However, it is altogether correct and appropriate that the utility proposing the use of

the information provide a compelling demonstration of the sufficiency of the information and the representativeness of sampled customer class demands.

Q. Mr. Granum addresses your criticisms of the development of demand factors for Shorewood and Milwaukee County contained in the Customer Demand Study. Could you respond?

A. Ironically, the testimony that Mr. Granum jibes "seems out of context and irrelevant to this issue" (Rebuttal-MWW-Granum-12, line 8) was my attempt to acknowledge that some of the coping mechanisms used by the Demand Study to address data gaps were not problematic. He then parses together disparate pieces of information to suggest that my conclusions are internally inconsistent. My points are simple, internally consistent, and relatively limited. I simply note that using commercial customer demand factors for the only wholesale customer not part of the Wholesale Customer Group, rather than the class average, for example, will have the effect of increasing the Wholesale Customer Group's relative shares of peak-demand related costs. This is not a major conclusion on my part; it is just the arithmetic of the COSS. Mr. Granum asserts that it is appropriate to assume Milwaukee County mimics the retail commercial class; I would note that the point of a monitoring program is to avoid the necessity to make such assumptions. In the event of a failure to collect requisite data, assumptions that are to the detriment of wholesale customers, for whom exceptional rate increases are proposed, warrant a measure of skepticism.

As to the issue of Shorewood, Mr. Granum notes:

> *MWW began to collect hourly demand data from Shorewood in March 2014; however, there is insufficient data available at the time of this testimony to determine appropriate peak demand factors using this data.* (Rebuttal-MWW-Granum-12, line 23 to -13, line 2.)

Here again, in the absence of monitoring data, we are left to make an assumption about

Shorewood's demand that Mr. Granum asserts is reasonable as a coping mechanism for MWW's data collection failure. Perhaps it is, perhaps not.

Q. Mr. Granum offers further clarification of the residential analysis in the Demand Study to contend that the calculated demand factors are valid. How do you respond?

A. Mr. Granum's further clarification fails to rehabilitate the crippling inadequacies of the residential analysis. The additional data presented is of little consequence, and his "test" of my assumptions ill conceived. Mr. Granum states:

> *Although there is not a comparison of **retail residential** monthly maximum day to average day ratios for each month in both 2012 and 2013, there is information comparing the maximum day to average day ratios month by month for **wholesale customers** that includes the 2012 and 2013 maximum months and days, which is shown in Ex.-MWW-Granum-10.* (Rebuttal-MWW-Granum-13, lines 14-18, emphasis added).

Mr. Granum then suggests that the relative consistency exhibited in the **wholesale** customer classes' monthly maximum-day to average-day ratios across 2012 and 2013 somehow "tests" the variability of **retail residential** demand patterns. One must wonder how so? Especially since the wholesale customer classes' monthly maximum-day to average-day ratios determined by the Study across 2012 and 2013 were "much more determined by each customer's own internal operation of their respective water supply systems and use of their internal storage facilities." (Rebuttal-MWW-Granum-10, lines 1-4.) How does information on the wholesale customers' internal operation of their systems provide any information on retail residential demand patterns in 2012 and 2013? Does not the PSC call for sufficient information require avoiding this sort of baseless assumption?

Q. Do the further clarifications, exhibits or rebuttal testimony provided by Mr. Granum alter your perspectives on the inferences that can be drawn from the Demand Study?

A. No. Mr. Granum simply refers to the Demand Study and reiterates his contention that

inferences can be drawn from the data, and that appropriate consideration was given to the time periods of data collection. I continue to respectfully disagree.

Mr. Granum also declares that my statement that there is "inconsistency in the populations sampled across metering periods" . . . "is unclear and requires further explanation." (Rebuttal-MWW-Granum-14, lines 15-16.) Though I am not sure what is unclear, I am referring to information in the Demand Study that delineates the data issues quite clearly. The differences in sample sizes across metering periods are provided in the Demand Study's review of retail class data collection. (See Ex-MWW-Cramer-2; Residential Analysis, p. 71; Commercial Analysis, p.75; Industrial Analysis, p. 83; and Public Authority Analysis, p. 87.) Some of the concerns are also summarized in the Demand Study's discussion of data limitations. (Ex-MWW-Cramer-2, p. 67.)

Q. Mr. Granum claims that the data collected disproves the intuitive and logical assumption that "peak to average demands are higher than other periods when the system is peaking." (Rebuttal-MWW-Granum-15, lines 6-9.) What is your response?

A. Perhaps the best way to illustrate my point is to refer to Schedule 9 of MWW's COSS, labeled Customer Class Demand Ratios, that employs the outcomes of the Customer Demand Study. (Ex-MWW-Wright-2, Schedule 9.) There we see in Column D (of the "live" version of the COSS) that the Average Day volume value is based on an **annual** average. The demand ratios listed under the Extra Capacity Max-Day Demand section (Column H – Extra Capacity Ratio) and under the Extra Capacity Max-Hour Demand section (Column M – Extra Capacity Ratio) describe a relationship to **annual** average-day volume. Max-day and max-hour volume rates estimated from these relationships are used to distribute cost responsibilities across customer classes.

Now, consider Mr. Granum's explanation of the calculation of the demand factors reported in Table 24 of the Customer Demand Study. (Rebuttal-MWW-Granum-15-17). Specifically related to the residential class, the Demand Study states that:

> *The combined average day usage during the first sample period is 20,917 units. When examining the coincident peak (summing usage on each day for all customers, then taking the peak of the daily totals), the analysis shows maximum daily usage of 24,919 units* ***for the first sample period****. This results in a residential sample MD:AD ratio of 1.191.* (Ex-MWW-Cramer-2, p. 71, emphasis added)

Whether there is relative consistency in the peak to average demand patterns across sampling periods is not relevant. Rather, the critical question is whether there is variability in **annual peak** to average demand patterns. It is the annual peak to average demand patterns that are relevant to cost allocations. The relative consistency of peak to average demand patterns over selected sampling periods neither proves nor disproves anything about the variability of demand over the entirety of a year.

Q. In his rebuttal testimony, Mr. Granum explains Table 24 of the Customer Demand Study. (Ex-MWW-Cramer-2.) **Are your concerns with the data presented in Table 24 assuaged by his rebuttal testimony?**

A. No. Despite Mr. Granum's explanations and justifications, the data gaps in the Demand Study remain crippling. The collected data is simply inadequate for deriving demand ratios based on annual peak to average demand patterns that are relevant to cost allocations.

A simple example may help to illustrate (without being an oversimplification) the problems with the averaging of period specific demand ratios for purposes of calculating non-residential demand ratios:

Assume that a customer class' annual demands are described by 3 separate 4-month periods. The average monthly demand for periods 1 and 3 are 7,500 units while the average monthly demand for period 2, the peak period, is 15,000 units. Also assume that the max-day demands in the respective periods are 14,250 units for periods 1 and period 3 while the peak period 2 maximum is 30,000 units. In this case, total class demand is 120,000 units or an annual average of 10,000 units per month **and the peak to average ratios are quite consistent** – 1.9 for periods 1 & 3, and 2.0 for period 2.

Applying the procedure of the Demand Study and calculating the average of the averages results in a ratio of 1.933 -- which underestimates the proper class demand ratio across the sampling periods of 2.0. And, this is true even after applying the ratio of peak period average-day demand to annual average-day demand intended to derive the annual demand ratios (as done for the ratios used in MWW's COSS). Here the peak period average-day demand is 15,000 units while the annual average-day demand is 10,000 units – yielding a seasonal peaking factor adjustment of 1.5. The class demand ratio is clearly 3.0; the averaging of the averages results in a calculated class demand ratio of 2.9. (1.933*1.5).

Extending this example a bit further, one can illustrate the concern with missing the system peak demand periods. Add a second year where the 3 periods are characterized by monthly average-day demands of 6,000, 12,000, and 6,000 units (equaling 96,000 units or 80 percent of Year 1) – and sampling period maximum-day demands of 8,700, 18,000, and 8,700 – again yielding relatively consistent sampling period demand factors of 1.45, 1.50, and 1.45 (for an average of 1.47). While the

same problem with averaging of the averages applies here as well – generating a 2.2 annual demand ratio (1.47*1.5) rather than the actual 2.25 ratio (18,000 / (96,000/12)) - the salient point is that capturing the peak periods is exceptionally important. Consider, for example, if the peak period data in Year 1 is not collected. The average of the demand ratios for those periods that were sampled in year 1 is axiomatically 1.9, and the proper seasonal adjustment devolves to 1.425 (14,250/10,000) yielding a calculated 2.71 annual demand factor in contrast to the actual demand factor of 3.0. Averaging across the ratios developed for both years, as done by the Demand Study, offers no cure. ((2.71+ 2.2)/2 = 2.45 while the true average across the 2-year period is 2.63 ((3.0+2.25)/2).

In short, the fact that there is consistency in the demand ratios drawn for individual sampling periods does not provide a cure for the problems of patchwork sampling. Moreover, when the fundamental intent of the monitoring protocol is to assess a single period of extreme demand relative to annual averages, the failure to measure those extremes discounts the validity of any averaging of the remaining demand ratios across non-peak periods.

Mr. Granum spends considerable time refuting a misinterpretation of my statement that is perhaps a result of the possible mutual misunderstanding of selected terms noted above. He provides ample class-by-class data on idiosyncrasies of **sampled** peak to **sampled** average month demand ratios. As Mr. Granum notes, these ratios may be affected by weather sensitivities, industrial production and associated constraints, and other factors – and offers interesting anecdotal information. However, Mr. Granum does not demonstrate the validity of averaging together averages from multiple years or show that monthly or

quarterly maximum to monthly to quarterly average consumption relationships within part of a year hold for describing **annual** maximum to average relationships. Mr. Granum does not demonstrate that one can measure different customer classes during different times of the year or different years and use the measurements to describe relationships between the various classes.

Q. Mr. Granum's rebuttal provides further explanation of the derivation of seasonal adjustment factors, and clarifies the results of the analysis of maximum hour peak demand factors. (Rebuttal-MWW-Granum-18 and -20). Do these further explanations adequately address the concerns you have noted?

A. The additional information is interesting, but not compelling. It should be kept in mind that these are explanations of coping mechanisms necessitated by the significant data gaps discussed at length in the Wholesale Customer Group's witnesses' direct and rebuttal testimony.

Q. Mr. Granum's rebuttal testimony states that the demand factors were not developed to represent peak period demand over a common time period but rather to represent a typical, or average, time period. (Rebuttal-MWW-Granum-20, lines 1-5.) What is your response?

A. The demand ratios are used to distribute cost responsibilities on the basis of class contributions to system peak demands.

Q. Mr. Granum concludes his rebuttal testimony with a defense of the overall methodology of the Customer Demand Study in response to your criticisms. (Rebuttal-MWW-Granum-21 to 22.) Do you have comments in response?

A. I certainly appreciate that there was considerable time, effort and expense involved in conducting the Customer Demand Study. I also understand that a full-scale, demand metering program is a difficult undertaking imposing a daunting array of logistical, data management and analytical challenges. I trust that the experience MWW gained in conducting this Customer Demand Study (if not the data actually collected) will inform future efforts – and lead to more comprehensive data collection of demonstrably representative samplings of customer classes.

However, as is amply demonstrated in the testimony of the Wholesale Customer Group's witnesses, the demand factors derived from the Customer Demand Study are not reliable, do not provide sufficient information, and will not result in "fair, reasonable and appropriate peak demand factors"– notwithstanding the time, effort or expense incurred to date.

Q. Do you have any final comments regarding the rebuttal testimony offered by MWW and its consultants from Raftelis Financial Consultants and Trilogy Consulting LLC?

A. I would simply note that the tone of MWW's rebuttal testimony is spirited and vociferous. My statements have been characterized as "all-knowing", misconstruing the intent of the very M1 manual of which I am a contributing author, oversimplifications, and implying untruths. While I do not take offense, I respectfully disagree.

Q. Are the opinions you express in this rebuttal testimony to a reasonable degree of professional certainty?

A. Yes.

Q. Does this conclude your rebuttal testimony?

A. Yes.